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CLAIMS

[Claim(s)]

[Claim 1] A fiber strengthening thermoplasticity constituent, i.e., (1) polyolefine, (henceforth (1) component)

(2) Rubber which can be vulcanized (henceforth (2) components)

(3) Thermoplastic polymer which has an amide group in a principal chain (henceforth (3) components)

It is the becoming constituent and (1) component and (2) components constitute a matrix. since -- It is distributing as fiber with detailed (3) components in this matrix. And (3) components (1) A constituent (A), natural rubber which have been combined with a component and (2) components, Polyisoprene or both mixture (B), natural rubber, diene system rubber (C) except polyisoprene, and a rubber constituent for based red characterized by coming to blend carbon black (D) and satisfying conditions of following (i) thru/or (iv).

(i) An amount of said thermoplastic polymer (3) is 1 - 15 weight section to a total of 100 weight sections of a rubber component. (ii) The total quantity of natural rubber in the (A) component in a rubber component or polyisoprene, and the (B) component is 100 - 50 % of the weight. (iii) An amount of carbon black (D) is 35 - 45 weight section to a total of 100 weight sections of a rubber component, and a rate of an impact resilience as which vulcanizate of the (iv) constituent is specified to BS903 is 60% or more.

[Claim 2] A rubber constituent for based red according to claim 1 with which detailed fiber of thermoplastic polymer ((3) components) which has an amide group in a principal chain in a fiber strengthening thermoplasticity constituent (A) has a pitch diameter of 0.05-1.0 micrometers.

[Claim 3] A rubber constituent for based red according to claim 1 or 2 with which polyolefine ((1) component) in a fiber strengthening thermoplasticity constituent (A) has softening temperature 50 degrees C or more or the melting point of the range of 80-250 degrees C.

[Claim 4] Rubber ((2) components) in which vulcanization in a fiber strengthening thermoplasticity constituent (A) is possible is a rubber constituent for based red according to claim 1 to 3 which is the 10 - 400 weight section to the polyolefine ((1) component) 100 weight section.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention has Mooney viscosity (ML) and a small die swell, and is excellent in processability, and relates to the rubber constituent for based red whose vulcanizate is low febrility. The constituent of this invention can be further used also for industrial products, such as interior members of a tire, such as tire external members, such as a tread in a tire, and a sidewall, a carcass, a bead, a belt, and a chafer, and a hose, a belt, a rubber covered roll, a rubber crawler.

[0002]

[Description of the Prior Art] Generally, it is required that a tire should be excellent in controllability, endurance, etc., and to excel especially in safety in a field at the wet-proof skidding nature in a humid road surface is demanded. Moreover, in order to aim at reduction in dynamic loss in a tire based on the social need of saving-resources-izing in recent years, research and development of the small tire of rolling resistance, i.e., the small tire of energy loss, are done. Although the energy loss consumed with the tire of free rotation changes with the structures of a tire etc., the whole abbreviation 1/2 is consumed in the tread section. Therefore, if internal consumption of tread rubber is decreased, the energy loss at the time of tire rolling will decrease, and the small tire of rolling resistance will be obtained.

[0003] Then, to reform tread rubber so that it may become small [energy loss] is tried. However, refining of this rubber tends to reduce wet-proof skidding nature. Since amelioration of rolling resistance and amelioration of wet-proof skidding nature are the matters which generally conflict, in order to reconcile these, the various amelioration devices of tire structure are tried. As one of the device of the, making a tread bilayer-ization with a cap tread and based red is mentioned. That is, a tread will be bilayer-ized in the good cap tread of wet-proof skidding nature, and the small based red of energy loss, and the wet-proof skidding nature of a tire will be raised as a whole, and energy loss will be reduced.

[0004] The rubber of low febrility is required as rubber for based red. As rubber of low febrility, independent or the thing which blended carbon black with these rubber of natural rubber, polyisoprene rubber, cis1, and 4-polybutadiene rubber is used. Although the activity of carbon black with large particle diameter and reduction of the loadings of carbon black can be considered in order to make it low febrility, these methods will reduce the elastic modulus of rubber, and fatigue resistance.

[0005] Although there is also the method of blending nylon and the staple fiber of Vinyon and on the other hand high-elasticity-izing rubber, since adhesion with rubber is imperfection, destruction tends to advance in accordance with the interface of a staple fiber, and these staple fibers have the defect that the fatigue life under repetition expanding is short. In case a cap / base method is adopted in the tire for passenger cars, there is a problem on the manufacturing technology which is not seen in a large-sized tire. Since the tread gage is thin, it must extrude with sufficient dimensional stability carefully so that an edge piece may not be generated from an extruder. Moreover, since die swells differ, in the case of multilayer extrusion, cap tread rubber and base tread rubber require caution. If the die swell of base tread rubber becomes small, it is tended to solve these problems. If abundant combination of the carbon black of high reinforcement nature is carried out, a die swell will become small, but since pyrexia

becomes large, the method of satisfying a die swell and low pyrexia simultaneously is not found out.

[0006]

[Problem(s) to be Solved by the Invention] vulcanizate is low febrility and this invention aims at obtaining the small rubber constituent for based red of a die swell (Mooney viscosity -- and).

[0007]

[Means for Solving the Problem] This invention is a fiber consolidation thermoplasticity constituent, i.e., (1) polyolefine. ((1) component)

(2) Rubber which can be vulcanized ((2) components)

(3) Thermoplastic polymer which has an amide group in a principal chain ((3) components)

It is the becoming constituent and (1) component and (2) components constitute a matrix. since -- It is distributing as fiber with detailed (3) components in this matrix. And (3) components (1) A constituent (A), natural rubber which have been combined with a component and (2) components, It is related with polyisoprene or both mixture (B), natural rubber, diene system rubber (C) except polyisoprene, and a rubber constituent for based red characterized by coming to blend carbon black (D) and satisfying conditions of following (i) thru/or (iv).

(i) An amount of said thermoplastic polymer (1) is 1 - 15 weight section to a total of 100 weight sections of a rubber component. (ii) The total quantity of natural rubber in the (A) component in a rubber component or polyisoprene, and the (B) component is 100 - 50 % of the weight. (iii) An amount of carbon black (D) is 35 - 45 weight section to a total of 100 weight sections of a rubber component, and a rate of an impact resilience as which vulcanizate of the (iv) constituent is specified to BS903 is 60% or more.

[0008] Moreover, this invention relates to a rubber constituent for based red with which detailed fiber of thermoplastic polymer ((3) components) which has an amide group in a principal chain in a fiber consolidation thermoplasticity constituent (A) has a mean diameter of 0.05-1.0 micrometers.

[0009] Moreover, this invention relates to a rubber constituent for based red with which polyolefine ((1) component) in a fiber consolidation thermoplasticity constituent (A) has softening temperature 50 degrees C or more or the melting point of the range of 80-250 degrees C.

[0010] Furthermore, rubber ((2) components) which this invention can vulcanize in a fiber consolidation thermoplasticity constituent (A) is related with a rubber constituent for based red which is the 10 - 400 weight section to the polyolefine ((1) component) 100 weight section.

[0011] Mooney viscosity ML 1+4 (100 degrees C) is small, a swell ratio is 1.8 or less, and a rubber constituent for based red of this invention is ASTM of vulcanizate. Method of D623 Exoergic deltaT by A is 25 degrees C or less, it excels in processability and vulcanizate is low febrility.

[0012] In this invention (1) polyolefine, rubber in which (2) vulcanization is possible, It is the becoming constituent. (3) -- thermoplastic polymer which has an amide group in a principal chain -- since -- (1) A component and (2) components constitute a matrix and are distributing as fiber with detailed (3) components in this matrix. And although it is indispensable that (3) components blend a fiber consolidation thermoplasticity constituent combined with (1) component and (2) components and it blends fiber of thermoplastic polymer by this, a rubber constituent excellent in processability can be obtained.

[0013] First, a fiber consolidation thermoplasticity constituent of this invention is explained. This fiber consolidation thermoplasticity constituent makes main constituents (1) polyolefine, rubber in which (2) vulcanization is possible, and thermoplastic polymer which has an amide group in (3) principal chains, and (1) component and (2) components have constituted a matrix and it has structure where it is distributing in the matrix concerned as fiber with most detailed (3) components. And a staple fiber with detailed (3) components is combined with the matrix concerned.

[0014] Hereafter, (1) component of this fiber consolidation thermoplasticity constituent, (2) components, and (3) components are explained. (1) A component is polyolefine and has the melting point of 80-250 degrees C. Moreover, BIKATTO softening temperature 50 degrees C or more and a thing which has 50-200-degree C BIKATTO softening temperature especially are also used preferably.

[0015] As such polyolefine, they are C2 - C8. A homopolymer and a copolymer of an olefin, And C2 -

C8 A copolymer of an olefin and aromatic series vinyl compounds, such as styrene, and chloro styrene, alpha methyl styrene, C2 - C8 A copolymer of an olefin and vinyl acetate, and C2 - C8 An olefin, an acrylic acid, or a copolymer with the ester, C2 - C8 An olefin, methacrylic acid or a copolymer with the ester, and C2 - C8 It is mentioned as that for which a copolymer of an olefin and a vinylsilane compound is used preferably.

[0016] Specifically For example, high density polyethylene, low density polyethylene, polypropylene, An ethylene propylene block copolymer, an ethylene propylene random copolymer, a line -- low density polyethylene, the Pori 4-methyl pentene -1, polybutene -1, the poly hexene -1, and an ethylene-vinylacetate copolymer -- An ethylene acrylic-acid copolymer, an ethylene methyl-acrylate copolymer, An ethylene ethyl-acrylate copolymer, an ethylene acrylic-acid propyl copolymer, An ethylene butyl acrylate copolymer, an ethylene 2-ethylhexyl acrylate copolymer, There are an ethylene acrylic-acid hydroxyethyl copolymer, an ethylene vinyltrimetoxysilane copolymer, an ethylene vinyltriethoxysilane copolymer, an ethylene vinylsilane copolymer, an ethylene styrene copolymer, a propylene styrene copolymer, etc. Moreover, halogenation polyolefines, such as chlorinated polyethylene, and bromination polyethylene, chlorosulfonated polyethylene, are also used preferably. One sort of such polyolefines may be used and they may combine two or more sorts.

[0017] Next, (2) components are explained. (2) A component is rubber which can be vulcanized and can mention natural rubber, polyisoprene, polybutadiene, a styrene butadiene rubber, isobutylene isoprene rubber, chlorinated butyl rubber, brominated butyl rubber, acrylonitrile-butadiene rubber, etc. Natural rubber is desirable also in these. Moreover, what carried out epoxy denaturation of these rubber, and silane denaturation or a mallein-ized thing is also used.

[0018] Next, (3) components are explained. (3) In a principal chain, a component is thermoplastic polymer which has an amide group, and denaturalizes by silane coupling agent.

[0019] As thermoplastic polymer which has an amide group, a thermoplastic polyamide and a urea-resin are mentioned to a principal chain. As a desirable thing, a 135 to 350 degrees C thing is mentioned for the melting point among these, and a 150 to 300 degrees C thermoplastic polyamide is especially mentioned for the melting point as a desirable thing.

[0020] As a thermoplastic polyamide, nylon 6, Nylon 66, a nylon 6-Nylon 66 copolymer, Nylon 610, Nylon 612, Nylon 46, Nylon 11, Nylon 12, nylon MXD6, a polycondensation object of xylylene diamine and an adipic acid, A polycondensation object of xylylene diamine and a pimelic acid, a polycondensation object of xylylene diamine and a SUPERIN acid, A polycondensation object of xylylene diamine and an azelaic acid, a polycondensation object of xylylene diamine and a sebacic acid, A polycondensation object of a tetramethylenediamine and a terephthalic acid, a polycondensation object of a hexamethylenediamine and a terephthalic acid, A polycondensation object of octamethylene diamine and a terephthalic acid, a polycondensation object of a trimethyl hexamethylenediamine and a terephthalic acid, A polycondensation object of deca methylene diamine and a terephthalic acid, a polycondensation object of undecamethylene diamine and a terephthalic acid, A polycondensation object of dodeca methylene diamine and a terephthalic acid, a polycondensation object of a tetramethylenediamine and isophthalic acid, A polycondensation object of a hexamethylenediamine and isophthalic acid, a polycondensation object of octamethylene diamine and isophthalic acid, A polycondensation object of a trimethyl hexamethylenediamine and isophthalic acid, a polycondensation object of deca methylene diamine and isophthalic acid, a polycondensation object of undecamethylene diamine and isophthalic acid, a polycondensation object of dodeca methylene diamine and isophthalic acid, etc. are mentioned.

[0021] As most desirable thing, a thermoplastic polyamide with a melting point of 160-265 degrees C is mentioned among these thermoplastic polyamides, and nylon 6, Nylon 66, a nylon 6-Nylon 66 copolymer, Nylon 610, Nylon 612, Nylon 46, Nylon 11, Nylon 12, etc. are specifically mentioned.

[0022] In a thermoplastic constituent used by this invention, (1) component and (2) components form a matrix. This matrix may take structure which may take structure which (2) components distributed in the shape of an island in (1) component, and (1) component distributed in the shape of an island in (2) components to that reverse. (1) As for a component and (2) components, having joined together

mutually by the interface is desirable.

[0023] (3) The most is distributing a component in the above-mentioned matrix as detailed fiber. concrete -- the -- it is distributing especially 80% of the weight preferably 70% of the weight as fiber with 90 % of the weight or more it is desirable and detailed. (3) A range of a diameter of average fiber of fiber of a component being 1 micrometer or less of desirable especially a desirable range is 0.05-0.8 micrometers. As for an aspect ratio (fiber length/diameter of fiber), it is desirable that it is ten or more. And (3) components are combined with the above-mentioned matrix which consists of (1) component and (2) components by the interface. This can be confirmed as follows, for example. First, a fiber consolidation thermoplasticity constituent is flowed back in a solvent, for example, a xylene etc., which dissolves only (1) component and (2) components, and (1) component and (2) components are removed. If fiber of (3) components which remained is melted to a solvent and NMR is measured, a peak originating in (1) component and (2) components is observable. It is thought that this shows that (1) component and (2) components have combined with a front face of the fiber concerned in a certain form.

[0024] (1) As for a rate of a component, (2) components, and (3) components, it is desirable that it is as follows. (1) (2) components have the desirable range of the 10 - 400 weight section to the component 100 weight section, the range of the 20 - 250 weight section is especially desirable, and the range of the 50 - 200 weight section is the most desirable. (1) If there are more rates of (2) components than the 300 weight sections, since only a difficult fiber consolidation thermoplasticity constituent of pelletizing will be obtained to the component 100 weight section, it is not desirable. (3) As for a rate of a component, it is desirable that it is the range of the 10 - 400 weight section to the (1) component 100 weight section, its range of the 5 - 300 weight section is especially desirable, and its range of the 10 - 300 weight section is the most desirable. (3) If a rate of a component exceeds the 400 weight sections to the (1) component 100 weight section, since fiber with detailed (3) components will not be formed in a fiber consolidation thermoplasticity constituent, even if it manufactures a fiber consolidation elastic body using such a fiber consolidation thermoplasticity constituent, it is because a fiber consolidation elastic body with high reinforcement is not obtained.

[0025] A fiber consolidation thermoplasticity constituent is carried out according to a process as shown below, and can be manufactured. A process, a process 3 that a fiber consolidation thermoplasticity constituent of this invention makes the following processes, i.e., a process which prepares a matrix which it becomes from a process 1:(1) component and (2) components, and a process 2:(3) component react with a binder : The above-mentioned matrix, A binder and (3) components made to react can be manufactured more at a process which extrudes melting, a process to knead, and a kneading object Process 4: Obtained at temperature more than the melting point of (3) components, and extends and/or rolls it out at a temperature lower subsequently than the melting point of (3) components.

[0026] First, a process which prepares a matrix which consists of (1) component and (2) components is explained. (1) What is necessary is to carry out melting kneading, to make (1) component react with a binder previously, and just to do melting and kneading of this and (2) components, in order to prepare a matrix which consists of a component and (2) components. Moreover, (1) component and (2) components may be fused and kneaded with a binder. Equipment usually used for kneading of resin or rubber can perform melting and kneading. As such equipment, a Banbury mixer, a kneader, a kneader extruder, an opening roll, a 1 shaft kneading machine, a 2 shaft kneading machine, etc. are mentioned. [0027] To the (1) component 100 weight section, the range of the 0.1 - 2.0 weight section is desirable especially desirable, and an amount of a binder is the range of the 0.2 - 1.0 weight section. If there are few amounts of a binder than the 0.1 weight section, a constituent with high reinforcement will not be obtained, and if [than the 2.0 weight sections] more, a constituent excellent in a modulus will not be obtained.

[0028] As a binder, what is usually used as a coupling agent of macromolecules, such as a silane coupling agent, a titanate coupling agent, an initial condensate of novolak mold alkylphenol formaldehyde, an initial condensate of resol mold alkylphenol formaldehyde, an initial condensate of novolak mold phenol formaldehyde, an initial condensate of resol mold phenol formaldehyde,

unsaturated carboxylic acid and its derivative, and organic peroxide, can be used. A silane coupling agent is desirable at a point that making (1) component and (2) components gel among these binders can form little [and] association firm to an interface of these components. A silane coupling agent which has a radical and/or a polar group which take a hydrogen atom and are easy to be desorbed from it as a silane coupling agent from others, such as a vinyl group, ARUKIROKISHI radicals, etc., such as vinyl alkoxysilane, such as vinyltrimetoxysilane, vinyltriethoxysilane, and a vinyl tris (beta-methoxyethoxy) silane, a vinyl thoria cetyl silane, gamma-methacryloxypropyl trimethoxy silane, gamma-[N-(beta-methacryloxyethyl)-N and N-dimethylannmonium (chloride)] propyl methoxy silane, and a styryl diamino silane, is used preferably.

[0029] Organic peroxide can be used together in case a silane coupling agent is used as a binder. As organic peroxide, a thing of the melting point of (1) component or the melting point of (2) components whose half-life temperature is the range of the same temperature as the higher one thru/or a temperature higher about 30 degrees C than this temperature either is used preferably for 1 minute. Specifically, that whose half-life temperature is about 110-200 degrees C is used preferably for 1 minute. As this organic peroxide, it is 1 and 1-G tert-butyl peroxide, - 3, 3, a 5-trimethyl cyclohexane, 1 and 1-G t-butylperoxycyclohexane, 2,2-Di-t-butyl-peroxy-butane, 4 and 4-G tert-butyl peroxide BARERIN acid n-butyl ester, 2 and 2-screw (4 and 4-G t-butylperoxycyclohexane) propane, The peroxy neo decanoic acids 2 and 2, 4-trimethyl pentyl, peroxy neo decanoic-acid alpha-cumyl, Peroxy neohexane acid t-butyl, peroxy pivalate t-butyl, peroxy acetic-acid t-butyl, peroxy lauryl acid t-butyl, peroxy benzoic-acid t-butyl, peroxy isophthalic acid t-butyl, etc. are mentioned.

[0030] The amount of organic peroxide used has the desirable range of the 0.01 - 1.0 weight section to the (1) component 100 weight section.

[0031] However, when kneading and carrying out silane denaturation and using [melting and] natural rubber, polyisoprene, or a styrene isoprene styrene block copolymer for (2) components for (1) component and (2) components with a silane coupling agent, it is not necessary to use organic peroxide. It is because it is thought that cutting of a principal chain takes place by mechanochemical reaction at the time of kneading, and a kind of peroxide which has -COO and a radical at the principal chain end generates natural rubber, polyisoprene, and rubber that has isoprene structure like a styrene isoprene styrene block copolymer, and it carries out the operation as the above-mentioned organic peroxide with this almost same.

[0032] Next, a process which kneads (3) components with the above-mentioned matrix is explained. (3) After a component carries out melting kneading with a binder beforehand and making it react, it may carry out melting kneading with the above-mentioned matrix, and it may carry out melting kneading with the above-mentioned matrix under existence of a binder. It is the same as that of a case of the above-mentioned matrix preparation that it can carry out of melting kneading with equipment usually used for kneading of resin or rubber, for example, a Banbury mixer, a kneader, a kneader extruder, an opening roll, a 1 shaft kneading machine, a 2 shaft kneading machine, etc.

[0033] (3) When the total quantity of (3) components and a binder is made into 100 % of the weight, in the case of a binder to a component, 0.1 - 5.5% of the weight of a range is desirable, it is desirable, and is the most desirable. [of 0.2 - 3% of the weight of a range] [of 0.2 - 5.5% of the weight of especially a range]

[0034] As a binder, what is usually used as a coupling agent of macromolecules, such as a silane coupling agent, a titanate coupling agent, an initial condensate of novolak mold alkylphenol formaldehyde, an initial condensate of resol mold alkylphenol formaldehyde, an initial condensate of novolak mold phenol formaldehyde, an initial condensate of resol mold phenol formaldehyde, unsaturated carboxylic acid and its derivative, and organic peroxide, can be used. A silane coupling agent is the most desirable at a point that making (3) components gel among these binders can form firm association in an interface with a matrix few.

[0035] What has radicals which can form a nitrogen atom of -NHCO-association of (3) components and association by dehydration, a dealcoholization reaction, etc., such as an alkyloxy radical, as a silane coupling agent is mentioned. Specifically as this silane coupling agent, vinyl alkoxysilane, such as

vinyltrimetoxysilane, vinyltriethoxysilane, and a vinyl tris (beta-methoxyethoxy) silane, a vinyl thoria cetyl silane, gamma-methacryloxypropyl trimethoxy silane, gamma-[N-(beta-methacryloxyethyl)-N and N-dimethylammonium (chloride)] propyl methoxy silane, N-beta (aminoethyl) gamma-aminopropyl trimethoxysilane and a styryl diamino silane, gamma-ureido propyl triethoxysilane, etc. are mentioned. [0036] In this process, melting and temperature to knead need to be more than the melting points of (3) components about a matrix and (3) components. (3) a kneading object which a kneading object does not become the structure which a particle with detailed (3) components distributed in a matrix, therefore is applied even if it performs melting and kneading at a temperature lower than the melting point of a component -- spinning -- even if it extends, it is because (3) components cannot become detailed fiber. Moreover, as for kneading temperature, it is desirable that it is the temperature more than the melting point of polyolefine of (1) component or BIKATTO softening temperature.

[0037] A kneading object obtained at the above-mentioned process is extruded from a spinneret, an inflation die, or a T die, and, subsequently this is extended or rolled out.

[0038] In this process, a particle of (3) components in a kneading object deforms into fiber by spinning or extrusion. With a drawing or rolling which follows it, drawing processing is carried out and this fiber turns into firmer fiber. Therefore, it is necessary to carry out spinning and extrusion at temperature more than the melting point of (3) components, and they need to carry out a drawing and rolling at a temperature lower than the melting point of (3) components.

[0039] A drawing or rolling which follows spinning or extrusion, and this extrudes for example, a kneading object from a spinneret, and carries out spinning to the shape of the shape of a string, and thread, and this can be carried out by rolling round in a bobbin etc., imposing a draft. It says taking a high winding speed rather than spinning speed as imposing a draft here. As for a ratio (draft ratio) of winding speed / spinning speed, it is desirable to consider as the range of 1.5-100, and especially a thing to consider as the range of 2-50 is desirable. The ranges of most desirable draft ratio are 3-30.

[0040] This process can be carried out also by in addition to this rolling out continuously a kneading object which carried out spinning with a reduction roll etc. Furthermore, it can carry out also by rolling this round on a roll etc., imposing a draft, extruding a kneading object from a lay flat tube die or a T die. Moreover, you may roll out with a reduction roll etc. instead of rolling round on a roll, imposing a draft.

[0041] As for a fiber consolidation thermoplasticity constituent after a drawing or rolling (A), considering as a pellet is desirable. A fiber consolidation thermoplasticity constituent is because it can knead to natural rubber, polyisoprene or both mixture (B), natural rubber, diene system rubber (C) except polyisoprene carbon black (D), etc. and homogeneity by considering as a pellet.

[0042] Next, a rubber constituent for based red of this invention comes to blend the aforementioned fiber consolidation thermoplasticity constituent (A), natural rubber, polyisoprene or both mixture (B), natural rubber, diene system rubber (C) except polyisoprene, and carbon black (D).

[0043] As the aforementioned diene system rubber (C), polybutadiene, styrene-butadiene copolymer rubber, an isoprene-isobutylene copolymer, etc. are mentioned. As carbon black (D), less than [particle diameter 90mmicro], dibutyl phthalate (DBP) oil absorption of 70ml / thing 100g or more is used suitably. As carbon black, various carbon black, such as FEF, FF, GPF, SAF, ISAF, and SRF, HAF, is used.

[0044] About said each component, an amount of the (i) aforementioned thermoplasticity polymer ((3) components) is 1 - 15 weight section to a total of 100 weight sections of a rubber component. (ii) The total quantity of natural rubber in the (A) component in a rubber component or polyisoprene, and the (B) component is 100 - 50 % of the weight. (iii) An amount of carbon black (D) is 35 - 45 weight section to a total of 100 weight sections of a rubber component, and vulcanizate of the (iv) constituent is blended that a monograph affair in which a rate of an impact resilience specified to BS903 is 60% or more should be satisfied.

[0045] If there are few amounts of said thermoplastic polymer than said minimum, a rubber constituent with Mooney viscosity and a small die swell, and a large rate of an impact resilience of vulcanizate will not be obtained, but when there are more amounts of thermoplastic polymer than said maximum, it is in an inclination for Mooney viscosity and a die swell of a constituent to become large. The blending ratio

of coal of natural rubber or polyisoprene is in said inclination for the febrility of vulcanizate to get worse that it is out of range. If there are few amounts of carbon black than said minimum, a rate of an impact resilience of vulcanizate will become small, and when there are more amounts of carbon black than said maximum, Mooney viscosity and a die swell of a rubber constituent become large, and it is in an inclination for the febrility of vulcanizate to get worse. moreover, a rate of an impact resilience of vulcanizate -- said -- it is not suitable as a rubber constituent for based red in it being out of range.

[0046] A rubber constituent for based red of this invention is obtained by mixing said each component using kneading machines, such as a Banbury mixer, a kneader, an opening roll, and a 2 shaft kneading machine. Kneading temperature needs to be lower than the melting point of thermoplastic polymer which constitutes a detailed staple fiber in the fiber consolidation thermoplasticity constituent concerned. If it kneads at a temperature higher than the melting point of this thermoplastic polymer, since a detailed staple fiber in a fiber consolidation thermoplasticity constituent melts and it deforms into a spherical particle etc., it is not desirable.

[0047] Moreover, it is desirable to use a thing of a pellet type as a fiber consolidation thermoplasticity constituent. It is because a rubber constituent for based red which could knead a fiber consolidation thermoplasticity constituent (A) to a component and homogeneity of (B), (C), and (D), and detailed fiber distributed to homogeneity will be easily obtained if a fiber consolidation thermoplasticity constituent of a pellet type is used.

[0048] Additives, such as a vulcanizing agent, are blended with a rubber constituent for based red of this invention. A vulcanizing agent well-known as a vulcanizing agent, for example, sulfur, an organic peroxidation agent, a ** sulfur compound, etc. can be used. There is especially no limit about a method of blending a vulcanizing agent with a rubber constituent, and a well-known combination method can be adopted in itself. With a vulcanizing agent, white carbon, an activation calcium carbonate, superfines silicic-acid magnesium, High styrene resin, cumarone indene resin, phenol resin, a lignin, Reinforcing agents, such as denaturation melamine resin and petroleum resin, a calcium carbonate of various grade, Basic magnesium carbonate, clay, a zinc white, a silicious marl, regenerated rubber, Bulking agents, such as powdered rubber and ebonite powder, an aldehyde, and ammonia Aldehyde amines, guanidine, thiourea, and thiazoles Vulcanization accelerators, such as thiurams, dithiocarbamate, and xanthate, Vulcanization acceleration assistants, such as a metallic oxide and a fatty acid, amine aldehydes, and amine ketones Process oil of amines, phenols, imidazole derivatives, a ** sulfur system or phosphorus-containing *****, a naphthene, or an aroma tick system etc. can be blended in the range which does not spoil this effect of the invention, and a constituent can be prepared. It is desirable to blend process oil of 1 - 30 weight section with a constituent of this invention to the rubber 100 weight section especially.

[0049] Vulcanizing temperature of a rubber constituent of this invention has desirable about 100-190 degrees C. However, vulcanizing temperature needs to be a temperature lower than the melting point of thermoplastics which constitutes detailed fiber in a rubber constituent. It is because fiber formed in a phase of preparation of a fiber consolidation thermoplasticity constituent with much trouble will melt, it will excel in processability and a small rubber constituent of the heat generation characteristic of vulcanizate will not be obtained, if it vulcanizes at temperature more than the melting point of this thermoplastics.

[0050] A rubber constituent of this invention has a small die swell, since vulcanizate is a low heat generation characteristic, can be conventionally replaced with a well-known rubber constituent for based red, and can be used with other tire members (a cap tread, a sidewall, a chafer, a rim, bead, etc.) as tire members, such as a passenger car, a bus, a truck, and an airplane.

[0051]

[Example] Hereafter, an example and the example of a comparison are shown and this invention is explained concretely. In the example and the example of a comparison, observation of the distributed configuration of the (the component of (3)) in a fiber consolidation thermoplasticity constituent and the Mooney viscosity of the obtained rubber constituent for based red, a swell ratio, a modulus of elasticity in tension, tensile strength, hardness, the rate of an impact resilience, and the heat generation

characteristic were measured as follows.

[0052] (1) Observation of the distributed configuration of (3) components in a fiber consolidation thermoplasticity constituent : it flowed back at 100 degrees C in the mixed solvent (capacity factor 50:50) of o-dichlorobenzene and a xylene, and inner polyolefine and an inner elastomer were extracted, the pellet of each sample was removed, and the fiber which remained was observed with the electron microscope.

(2) Mooney viscosity JIS K6300 is followed and it is 100-degree C Mooney viscosity ML 1+4. It measured.

(3) About the rubber constituent of die-swell sheep vulcanizate, it measured using the capillary tube rheometer in ratio-of-length-to-diameter=2mm of a die / 1mm, the extrusion temperature of 100 degrees C, and shear rate 360sec-1.

(4) A modulus of elasticity in tension, tensile strength, hardness JIS According to K6301, a modulus of elasticity in tension M100, tensile strength, and hardness were measured.

(5) According to the rate BS 903 of impact resilience, it measured using the Dunlop TORIPUSO meter.

(6) Heat generation characteristic ASTM Method of D623 It measured according to A.

[0053] [Sample 1] Using polypropylene (the Ube Industries, Ltd. make, UBEPO repro JI09, melting point [of 165-170 degrees C], and melt-flow-index 9g / 10 minutes) as (1) component, natural rubber (NR, SMR-L) was used as (2) components, and nylon 6 (Ube Industries, Ltd. make and Ube nylon 1030B, melting point of 215-220 degrees C, molecular weight 30,000) was used as (3) components. (1) To the (1) component 100 weight section concerned, the component carried out melting kneading with 4 of gamma-methacryloxypropyl-trimethoxy-silane [of the 0.5 weight sections], and the 0.1 weight section, and 4-G tert-butyl peroxide BARERIN acid n-butyl ether, and denaturalized. (3) To the (3) component 100 weight section concerned, the component carried out melting kneading with the N-beta (aminoethyl) gamma-aminopropyl trimethoxysilane of the 1.0 weight sections, and denaturalized.

[0054] First, the (1) component 100 weight section which denaturalized as mentioned above was kneaded with the (2) component 100 weight section and a Banbury mixer, and the matrix was prepared. This was pelletized after discharge at 170 degrees C. Subsequently, this matrix and the (3) component 100 weight section were kneaded with the 2 shaft kneading machine warmed at 240 degrees C, and the kneading object was pelletized. It extruded in the shape of a string with the 1 shaft extruder which set the obtained kneading object to 245 degrees C, and it pelletized by the pelletizer, taking over by draft ratio 10. When the obtained pellet was flowed back in the mixed solvent of o-dichlorobenzene and a xylene, polyolefine and NR were removed and the configuration and diameter of fiber which remained were observed with the electron microscope, it has checked that it was for fiber of 0.2micro of diameters of average fiber.

[0055] [Sample 2] Except having increased the quantity of the rate of the nylon 6 of (3) components in the 200 weight sections to the polypropylene 100 weight section of (1) component, like the sample 1, the sample 2 was prepared and this was pelletized. When the obtained pellet was flowed back in the mixed solvent of o-dichlorobenzene and a xylene, polyolefine and NR were removed and the configuration and diameter of fiber which remained were observed with the electron microscope, it has checked that it was for fiber of 0.2micro of diameters of average fiber.

[0056] [Sample 3] Except having made [the polypropylene of (1) component] the nylon 6 of 75 weight sections and (3) components into the 87.5 weight sections for the natural rubber of the 100 weight sections and (2) components, the sample 3 was prepared like the sample 1 and this was pelletized. When the obtained pellet was flowed back in the mixed solvent of o-dichlorobenzene and a xylene, polyolefine and NR were removed and the configuration and diameter of fiber which remained were observed with the electron microscope, it has checked that it was for fiber of 0.2micro of diameters of average fiber. As mentioned above, each component of samples 1-3 reaches comparatively, and the configuration of the fiber of nylon 6 is shown in a table 1.

[0057] [Example 1] The vulcanization accelerator and the compounding agent except sulfur were kneaded among the combination formulas shown in a table 2 by B mold Banbury (capacity of 1.7l.) set to 100 degrees C and 77rpm, using a sample 1 as a fiber consolidation thermoplasticity constituent, and

the kneading object which is a rubber constituent for based red was obtained. Under the present circumstances, the highest kneading temperature was prepared at 170-180 degrees C. subsequently, a vulcanization accelerator and sulfur were kneaded for this kneading object on the 10 inch roll, after carrying out roll appearance of this to the shape of a sheet and making it into it, it put into metal mold, and vulcanized and vulcanizate was obtained. Vulcanization was performed in 145 degrees C and 40 minutes. A result is collectively shown in a table 2.

[0058] [Examples 2 and 3] The rubber constituent for based red was obtained like the example 1 except having changed the fiber consolidation thermoplasticity constituent to be used into the sample shown in a table 2. A result is collectively shown in a table 2.

[0059] [Examples 4-6] The blending ratio of coal of each component was changed as shown in a table 2, and also the rubber constituent for based red was obtained like the example 1. A result is collectively shown in a table 2.

[0060] [Examples 7-10] The class of carbon black to blend was changed, and also it carried out like the example 1. A result is collectively shown in a table 2.

[0061] [Example 1 of a comparison] The rate of each component was changed, as it was shown in a table 2 without using a fiber consolidation thermoplasticity constituent, and also the rubber constituent for based red was obtained like the example 1. A result is collectively shown in a table 2.

[0062]

[A table 1]

		サンプル1	サンプル2	サンプル3
各成分の 割合 (重量比)	PP	100	100	75
	NR	100	100	100
	ナイロン6	100	200	87.5
PA6 (ナイロン6)の 形状	形態	微細繊維	微細繊維	微細繊維
	平均径 (μm)	0.2	0.2	0.2
	長さ (μm)	> 15	> 15	> 15

[0063]

[A table 2]

	実施例 1	実施例 2	実施例 3	実施例 4	実施例 5	実施例 6	実施例 7	実施例 8	実施例 9	実施例 10	比較例 1
増強化 炭素繊維 組成物	9774 1 8 (部)	9774 2 8 (部)	9774 3 9 (部)	9774 3 9 (部)	9774 3 15 (部)	9774 3 8 (部)	9774 3 8 (部)	9774 3 8 (部)	9774 3 8 (部)	9774 3 9 (部)	-
NR	67 (部)	68.5 (部)	68.8 (部)	48.6 (部)	44.3 (部)	48.6 (部)	98.8 (部)	98.8 (部)	98.8 (部)	98.8 (部)	50
BR (注1)	30 (部)	30 (部)	30 (部)	50 (部)	50 (部)	20 (部)	-	-	-	-	50
SBR (注2)	-	-	-	-	-	30 (部)	-	-	-	-	-
カーボンブラック (注3)	N-330 40 (部)	N-330 40 (部)	N-330 40 (部)	N-330 40 (部)	N-330 35 (部)	N-330 45 (部)	N-440 40 (部)	N-550 40 (部)	N-660 40 (部)	N-770 40 (部)	N-330 50 (部)
アロマトイックオイル 量 (部)	10 (部)	10 (部)	10 (部)	10 (部)	10 (部)	10 (部)	10 (部)	10 (部)	10 (部)	10 (部)	10 (部)
全ゴム分に対する ナイロンの割合 (PHR)	3	3	3	3	5	3	3	3	3	3	0
ベーストレット用組成物 ML (100℃)	56	58	57	58	55	64	64	55	50	47	63
スウェル比	1.7	1.7	1.7	1.8	1.8	1.5	1.7	1.7	1.7	1.8	2.0
加硫物	109	103	110	96	108	106	132	141	130	134	95
引張強さ (kg/cm ²)	265	272	265	255	235	258	275	287	245	243	284
硬さ	65	55	65	62	64	61	62	64	62	62	58
反発弾性率 (%)	63	64	64	64	62	62	61	63	64	64	63
発熱 ΔT (℃)	18	16	16	16	16	19	15	15	14	14	27

[0064] (notes 1) BR : polybutadiene (UBEPOL-BR100, Ube Industries, Ltd. make)

(notes 2) SBR : styrene-butadiene copolymer rubber (SBR-1500, Japan Synthetic Rubber Co., Ltd. make)

(Notes 3) N-330:HAF, particle diameter 30mmicro, DBP oil absorption 110ml/100gN-440:FF Particle diameter 38mmicro, DBP oil absorption 75ml/100gN-550:FEF, Particle diameter 41mmicro, DBP oil absorption 122ml/100gN-660:GPF, Particle diameter 84mmicro, DBP oil absorption 81ml/100gN-770:SRF, Particle diameter 71mmicro, DBP oil absorption A compounding agent zinc white besides 76ml / 100g (notes 4) : [The three sections,] Stearin acid: The two sections, antioxidant N-phenyl-N'-isopropyl-p-phenylene diamine: The one section, vulcanization accelerator N-oxy-diethylene benzo thiazyl-2-sulfenamide: The 0.8 sections, the sulfur: 1.5 section

[Translation done.]